[redacted]

STATINTL

October 26, 1964

STATINTL Attention: [redacted] STATINTL

Gentlemen: STATINTL STATINTL

As a result of recent developments at the [redacted] we are able to offer our customers two new optical systems for use on [redacted] Type 621 Comparators, one with the capability of resolving 200 line pairs per millimeter at the film plane, the other of resolving 400 line pairs per millimeter at the film plane. Each of these systems is a zoom (2:1 ratio) binocular microscope with a magnification range of 20X to 40X when using 5X eyepieces, 40X to 80X when using 10X eyepieces on the 400 line system, 17.5X to 35X when using 5X eyepieces, and 35X to 70X when using 10X eyepieces on the 200 linesystem. A variable high intensity tungsten light source, which requires a traveling sub-stage condenser lens and mirror assembly mechanically servoed to the motion of the optical system is also supplied with this microscope. [redacted] STATINTL

It would be required that your [redacted] Type 621 Comparator be picked STATINTL up by our field engineer and returned to our plant in [redacted] to perform this work because machining and subsequent rescraping of the base, bridge, and bridge brackets is necessary for adaptation of the system.

Since the comparator will be at our plant and torn down for the above modifications, we propose to repair the damage done to the comparator as a result of extremely high humidity it had been accidentally subjected to. The refurbishing work to bring the comparator to a like-new condition would consist of the following:

1. Recut and relap the Y Axis lead screw and replace the Y Axis precision nut.

2. Relap the X Axis lead screw and if necessary replace the X Axis precision nut.

3. Replace all the precision ball bearings in the system.

4. Rewire the entire electrical system, replacing all electrical components, switches, etc.

5. Rescrape entire instrument.

6. Refinish all parts where possible.

7. Modify the comparator table for the new illumination and replace the chair.

8. Repaint the entire instrument.

Upon completion of the above work, the comparator would be re-assembled, recalibrated, delivered and installed at your facility in Washington, D.C. by a [redacted] field engineer.

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The cost of the above work with either of the two optical systems is as follows:

1. 400 line system [redacted] STATINTL

2. 200 line system

Our terms are net 30 days. This quotation shall be firm for a period of 45 days.

Upon receipt of contract, [redacted] STATINTL would proceed to manufacture the required parts for the modification and would pick up the equipment at a point which would keep the total down time to a minimum. It is estimated that we would return the equipment to our plant in 30 to 45 days and complete the modification and refurbishing in an additional 30 to 45 days.

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Very truly yours,

[redacted]

Manager, Engineering Dept.

CWZ:mb

Design Objectives for New Viewing Optics
for a 8009 [redacted] Comparator

Rec'd from Navy PIC 20 JUL 1962 STATINTL

1. Operational Concepts.- These design objectives describe the requirements to be met in designing high resolution viewing optics for two Model 8009 [redacted] STATINTL parators. This microscope is intended to increase the maximum utilization of this instrument when measuring high resolution materials. The new system must provide higher resolution, greater magnification and binocular viewing along with an improved reference mark or reticle. The present illumination system must be replaced or modified to complement the new optics. The Model 8009 [redacted] Comparator STATINTL are retained at the Naval Photographic Interpretation Center and will be available for familiarization to the contractor receiving the award.

2. General Description.- The new optics shall consist of a binocular microscope containing a zoom pod capable of providing continuously variable magnifications between 10X and 50X. This microscope shall provide ultra-high resolution viewing and shall be mountable upon the existing mounting points utilized by the present system. All of the necessary optical controls must be mounted upon the microscope unit within easy reach of the operator. A higher intensity continuously variable illumination source shall be designed to replace the present fixed intensity system.

3. Detailed Requirements.-

a. Optical

(1) Magnification. The magnification shall be of the continuously variable or Zoom type with a range of from 10X - 50X.

(2) Resolution. Resolution shall be of the highest possible quality obtainable within the present "state-of-the-art". A resolution of 8 times the magnification, expressed in lines/mm is a desired goal.

(3) Image quality. The image quality shall be of the very highest. The image field shall be flat and free of color and other distortions.

(4) Eyepiece focus. Provision shall be made for independent eyepiece focus adjustments to accommodate variations in the visual acuity between the right and the left eyes.

(5) Interpupillary distance. Provision shall be made for adjustment of the binocular eyepieces to accommodate variations in interpupilary distance between different operators. A locking device shall be provided so that once the operator determines the most comfortable setting for his requirements, it can not be inadvertantly changed.

(6) Fine focus. A means shall be provided for adjusting the objective lens to bring the subject image into critical focus. This fine focus shall be maintained throughout all magnification setting changes.

(7) Reference mark. A fine reticle, minute dot, point of light or alternate advanced reference system shall be provided within the microscope viewing system. This reference system shall be appropriate to the magnifications and measurement accuracies involved. The system must insure adequate optical repeatability commensurate with the ± 1 micron measurement accuracy of the comparator lead screw system. An individual focus adjustment shall be provided for bringing this reference mark into sharp focus. The inclusion of an indicator or graduations which will indicate when the reference mark is at optimum focus is a design goal.

(8) Size of angular field. The angular dimension of both the apparent and the actual optical fields of this system shall meet standards characteristic of good microscope design.

(9) Size of the exit pupil. The size of the exit pupil and the distance of the eye from the eyepiece shall meet standards characteristic of good microscope design.

b. Illumination.- A high intensity illumination system shall be provided. This system shall furnish even illumination over the entire field of view throughout the entire magnification range. The light shall be essentially white and of such an intensity that both the image and the reference mark shall be distinctly visible at all magnifications. This illumination shall be continuously variable from 25% - 100% of the full intensity. In addition, a means shall be provided for back-lighting the stage plate to facilitate orientation of work materials. A special problem exists, in that the microscope may translate a maximum of 18" during "x" measurements. The present system solves this problem with a long fluorescent tube and fron surface mirror to provide light throughout the range of travel. This tube also provides stage plate back-lighting. It is doubtful that a variation of this system will provide adequate illumination for 50X magnifications. It is mandatory that any proposed illumination system be kept as simple as possible within the bounds of the previously stated requirements.

c. The two comparators to be modified under the pend g contract are Serial Numbers 621006 and 88001 presently located at the Naval Photographic Interpretation Center.

Code: 82
File: 3900

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DESIGN OBJECTIVES FOR NEW VIEWING OPTICS
FOR A 8009 [redacted] COMPARATOR

1. OPERATIONAL CONCEPTS.

These design objectives describe the requirements to be met in designing high resolution viewing optics for a Model 8009 [redacted] Comparator. This microscope is intended to increase the maximum utilization of this instrument when measuring high resolution materials. The new system must provide higher resolution, greater magnification and binocular viewing along with an improved reference mark or reticle. The present illumination system must be replaced or modified to complement the new optics.

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2. GENERAL DESCRIPTION.

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3. DETAILED REQUIREMENTS.

a. Optical

(1) Magnification. The magnification shall be of the continuously variable or Zoom type with a range of from 10X - 50X.

(2) Resolution. Resolution shall be of the highest possible quality obtainable within the present "state-of-the-art". A resolution of 8 times the magnification, expressed in lines/mm is a desired goal.

(3) Image quality. The image quality shall be of the very highest. The image field shall be flat and free of color and other distortions.

(4) Eyepiece focus. Provision shall be made for independent eyepiece focus adjustments to accommodate variations in the visual acuity between the right and the left eyes.

(5) Interpupillary distance. Provision shall be made for adjustment of the binocular eyepieces to accommodate variations in interpupilary distance between different operators. A pressure clamp locking

device shall be provided so that once the operator determines the most comfortable setting for his requirements, it can not be inadvertantly changed.

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2. **GENERAL DESCRIPTION.**

The new optics shall consist of a binocular microscope containing a zoom pod capable of providing continuously variable magnifications between 10X and 30X. This microscope shall provide ultra-high resolution viewing and shall be mountable upon the existing mounting points utilized by the present system. All of the necessary optical controls must be mounted upon the microscope unit within easy reach of the operator. A higher intensity continuously variable illumination source shall be designed to replace the present rimed intensity system.

3. **DETAILED REQUIREMENTS.**

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